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Industrial Machine Identification Using Augmented Reality

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Abstract

Augmented Reality is an interactive experience of a real world environment. It has been used in the following fields Medical, Education, Mechanical Industries, Food Industries, Real Estate and so on. Since October 2020 the industrial growth is nearly about 26.18%, thereby it is seen that there is a gradual development for the manufacturing models. In current scenario, the freshers of mechanical industries are knowing the working of machineries by the user guide or trainers. As a fresher to the industry, they might have communication struggles to ask for the working of the machine with supervisors or experts. The normal learning process from the user guide by the freshers may take a long period of time and also for training the freshers by the experts may cost high. To overcome the issue, we propose an augmented reality application which can help the freshers to identify the industrial machines and also know the working of machine in three dimensional views. Our application is a interactive platform which will be handy for the freshers and it could be helpful for better understanding of a machine in short period of time in low cost.

Keywords: *Augmented Reality, Three Dimension, AR Camera.*

1. Introduction

This application completely based on Augmented Reality. It makes the education a perfect field for testing Virtual Reality and Augmented Reality solutions. This application is primarily focus on the large scale mechanical industries. There will be several different machines available. Each machine differs in their process and output. Our project is to bring the current user manual instructions which are very tedious to read, to the exciting and interactive augmented reality. Using such technique one doesn't worry about losing his/her paper instructions or having to go through the entire book to understand the instructions. Augmented Reality core is highly used in industries and assembly applications where it detects the points on the surface and the objects

appearing in the tracked plane. AR devices are available for the better training experience. So, the industrial fresher's skills will be trained practically with the virtual objects. In our project we gave the brief well explained study of an object in an real world interactive manner using AR, here the object is detailed described and dimensions of an object is perfectly designed and the ground is detected the object is "superimposed" on the ground where the dimensions are detected, the object is well adopted in that particular place with detected dimensions. The user can dismantle all the parts in the object they can reassemble all the parts of an particular object (example: CPU can be dismantled into many parts like disk driver, hard disk, wires, integrated circuits etc.), for each components the buttons are

created, you Can tap on the surface where you want to see your instructions. Then you can select all the components one by one to see where it should be placed. [1-5].The information about the selected component is given. Education is one of the markets that is very actively affected by technology and digitalization. School and university students today no longer want to learn only by reading books and copying texts. No, in their schools, they want the strength of technology. On the other hand, adding technologies to schools and universities increases the standard of education to a much higher degree. New learning formats contribute to greater student involvement, which in turn means that expertise and skills remain longer. Adapting technical solutions to education is therefore becoming increasingly widespread. Education can be very versatile when it comes to strategies of increasing student participation and interest in learning. Online tutorials, chatbots, game - based, and, of course, augmented reality. The lecturer will have an additional chance to raise the students' interest in the lesson by encouraging them to download an AR application that will enhance their learning experience. In universities, the same approach works well, or even better, because university students are always more motivated to learn than schoolchildren. Using high-end technology like augmented reality to make educational content richer and more engaging could help train more professionals. A smart phone is involved in all too much of a modern child's life.

2. Problem Identification

2.1. Aim of the paper

Each industry differs with a machine, so the fresher who are new to the industry may feel difficult to grasp the entire working process. The working process of each machine contradicts from one with another, therefore our new developed augmented reality based android application which may help the users to know the process progression easily just by scanning the QR code or Machine image or Bar-code or even with the unique machine number provided by the manufacturer. The scanning demonstration is shown in Fig.1.

2.2. Existing system

The existing system prevailing till now is the user guide or the user manual to know the entire functions of the machine which is available only in hard copy. The primary need of the user guide is to refer them when the user is completely new to the source or stuck between the working process. The user guide is composed of international language like English and also the regional language which benefits the local people too. In rare scenario there may be some applications that are feeded with information which is already present in the user manual or guide. Since there are only a Text and Images of the particular machine it may feel difficult for the users to know the exact working model of it. Even though the information's are available in soft copy are just same as the user manual. In the perspective of manufacturer, when printing the user manual it may cost for the paper and printing the information. It takes a over a period of time to understand the each process theoretically.[6-10].



Fig.1. basic scanning

2.3. Proposed System

This application is a newly proposed system or an idea that helps the person who is new to the work space. It is fed with the working details of the machine which may help the user in his/her industrial work. Our final goal is to easily relate the information to real world objects using an AR interface. Therefore, we impose the 3D model to its real world counterpart and track the user's display to make the augmentation visible. we also provide interactive visualization tools as part of the AR interface. Though everyone is in the developing country they relies on user manual to know about the working process. One cannot do search on a particular process immediately, at that moment they will be in the state of dilemma.

2.4. Advantages

Our proposed system is simple and easy for an industrial newcomer to visualize and understand the machine's working process using an augmented reality android app. 3D animation, like real objects, can be rotated and moved around. In addition to the

X- and Y-axes, there is a third axis, the Z-axis. As a result, the viewer sees the object from a different angle. Three-dimensional visualization is an excellent way to educate the public about a concept or project! Videos are more appealing and effective than .pdfs, images, or other traditional methods of project communication. One of the benefits of augmented reality apps is that they give the user real-time access to additional information about the machine. Developing augmented reality applications, for example, benefits the industry by allowing consumers to retrieve valuable information about the machine's characteristics, use, and availability. Augmented reality allows you to see an object in a personalized context. Its characteristics (size or colour) can be changed by the consumer or user, and it can be examined under all of its seams. AR has the potential to transform the industry by providing the best way to visualize machines by combining augmented virtual models with real-world objects.

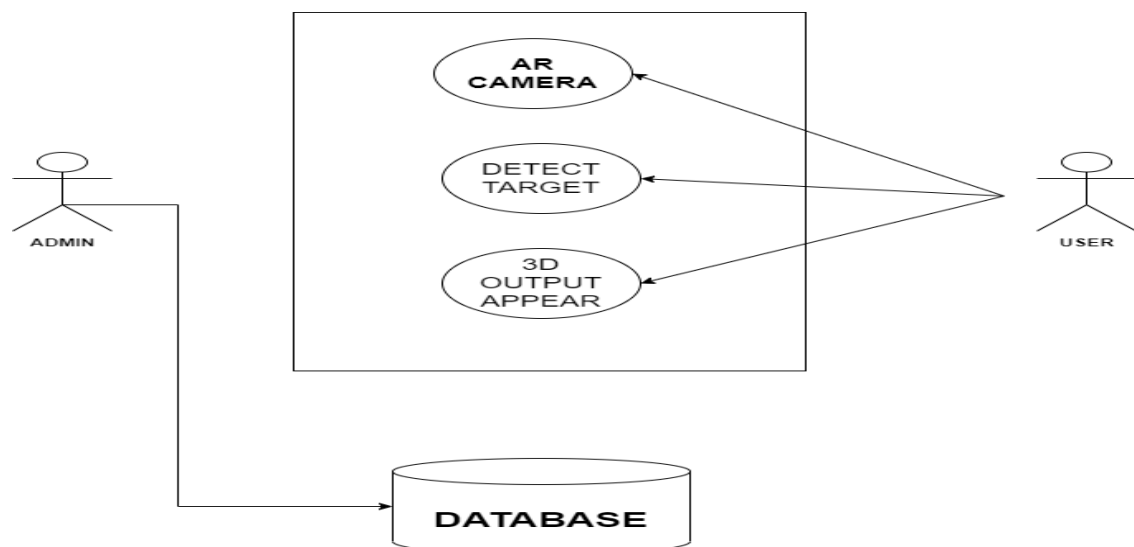


Fig.2. Use Case Diagram

2.5 Algorithm

This project is done using the Unity software, Vuforia and Google's AR core plugin. The plugin is imported to the unity software by importing all the packages within. The camera is changed into an AR camera and the model of our project is added by dragging and dropping into the scene view. Images that the Vuforia Engine can identify and track are referred to as Image Targets. By comparing extracted natural features from the

camera image to a known target resource database, the Engine detects and tracks the image. Vuforia Engine will detect the Image Target and use best-in-class image tracking technology to track the image and seamlessly augment your content. The database will contain a collection of these Image targets. Device targets and databases will be used in our app, implying that the database will be present inside the app. This is fine for smaller datasets, however for larger datasets, Cloud

Databases are ideal. The Vuforia developer portal is where databases and goals must be developed. Build a new Database by going to the Target Manager on the portal's website. It should be given a name and a Device type.

Conclusion

We presented a system to generate interactive 3D objects for Machine target or QR Code or Machine model number. The resulting 3D scene can be presented on a regular desktop or tablet computer or can be displayed directly within the user's real-world environment. Thus, our system enables a user to identify the machine and create Augmented Reality Visualizations. Therefore, we believe that our approach will become a key enabling technology to move from traditional manuals to modern interactive augmented videos. Thus, we believe that applications of our system will not substitute user manual entirely. Instead, they will speed up the process of learning by experiencing the working process in 3D objects to provide the user with the best information.

Future Work

Since this technology is new to the industrial field, our application deals with four to five prototypes yet our future work may deal with n number of machines in industries. Future work is concerned with making AR as a standardized learning platform to enhance the knowledge for the fresher.

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